

# FULMINATING CEREBRO-SPINAL MENINGITIS IN JAMAICA\*

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## INTRODUCTION

Three short official reports have been already devoted to this subject, namely: (1) On September 16th, 1912, in connection with certain obscure cases of so-called 'Vomiting Sickness' which suddenly attacked a family in Franklin Town (Kingston) and terminated fatally in four children within a space of twelve hours.

(2) On December 25th, 1912, when reporting upon the result of an examination of cases of 'Vomiting Sickness' at Porus, in Manchester.

(3) On January 7th, 1913; a further report on cases occurring in the same district (Porus), where the disease had apparently taken on an epidemic form.

Before entering on a description of the cases with which we are essentially concerned, I should like to mention four cases (two in April, one in June, and one in July, 1912) which were typical of the ordinary sub-acute variety of Cerebro-spinal Meningitis, and which, so to say, led up to the subsequent investigations. The first was a female child of 12 months, and the duration of illness was three weeks; the second was a male, aged 3 years, who lived for 6 days; the third was a lad of 17 years of age, ailing for a fortnight or so before the onset of any typical symptoms, and death took place a fortnight later; the fourth, a woman of 19 years, who was ill for fully three weeks, possibly longer. This also terminated fatally.

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\* This paper contains observations made up to Jan. 9th, 1913, at which date Dr. Harald Seidelin, on expedition for the Liverpool School of Tropical Medicine, arrived in Jamaica in order to investigate the so-called Vomiting Sickness. Dr. Seidelin suggests that these observations should be published in order to make known the work which had been done previously to his arrival.—H.H.S.

In all four a pure growth of meningococcus was obtained on nasgar, and proved by sub-culturing on the same medium and on ordinary agar, and incubating at 37° C. and at 25° C. Growth occurred only at the higher temperature, and in no case on ordinary agar until the third or fourth sub-culture. Maltose, dextrose and galactose were fermented, saccharose, lactose and mannite were unchanged.

#### SOME CASES IN KINGSTON

No similar cases came to my notice between July and September. On the 4th of the latter month a sudden outbreak of cases of a very acute nature occurred in Kingston itself, of which the following is a brief history, as reported on the 16th.

A cigar-maker, named Adolphus Peart, his wife and seven children, lived in a small house of two apartments, No. 6, Norfolk Lane, Franklin Town. Three of the children, named Constantine, Adolphus and Ruby, aged 8, 5 and  $3\frac{1}{2}$  respectively, were a little 'out of sorts' and had slight attacks of vomiting during Wednesday, September 4th, but were not, to all appearances, sufficiently ill to call for any treatment, and at night the whole family retired in ordinary health. About midnight, the youngest (Ruby) began to vomit, and shortly afterwards Adolphus and Constantine did the same. This, however, seems to have ceased temporarily and the children fell asleep again. In the early morning the second child (Adolphus) woke up, asked for some food, but, before having any, was seized by a convulsive attack; the other two (Constantine and Ruby) within a short period were similarly convulsed, and all three lapsed into a state of coma. A doctor was called in, but shortly after 7 a.m. the one first attacked (Adolphus) died. The other two were brought to the hospital at 9 a.m., suffered at intervals of a few seconds from convulsive seizures, the spastic condition of the neck in the case of the older patient, at all events, not completely relaxing even in the intervals, and the younger (Ruby) died at 10 a.m., the older (Constantine) at 10.55 a.m., without recovery of consciousness in either case.

In the meantime, the eldest girl of the family, Ethel, aged  $14\frac{1}{2}$  years, started to vomit and within a few minutes became, to a

certain degree at least, unconscious. She was also brought to the hospital, arriving at 9.30 a.m. When I saw her at 10.30, she had recovered consciousness, but showed rigidity of the neck (and possibly of the spinal muscles) and, while being examined, had a convulsive attack; these were repeated, but were not so severe as in the case of the boy. Nevertheless, the patient sank more deeply into coma, and died at 5.55 p.m. Thus, four of the children had died between 7 a.m. and 6 p.m.

No dietetic error could be discovered in any of the cases, and, apparently, the only previous history obtainable was of a 'cold in the head' for two or three days preceding. This, however, had been disregarded as the condition is common in the city.

Post-mortem examinations were held in all four cases; the details of three of them performed by me will be recorded shortly, after the history has been completed.

At the funeral of these four on September 7th, another sister, Violet, aged 11 years, suddenly complained of headache, vomited, and became collapsed and semi-conscious. She, too, was hurried off to the hospital. She had recovered consciousness by the time she arrived, but showed a slight degree of rigidity of the neck muscles; Kernig's sign present on the right side, but less pronounced or doubtful on the left. The vomiting was effortless, and not accompanied by marked nausea; the pupils were equal and somewhat dilated. This patient made a good recovery.

#### PATHOLOGICAL DETAILS

Cerebro-spinal fluid was taken by lumbar puncture from Constantine, Ethel and Violet. (Ruby was dead in the hospital, and Adolphus had died at home.) The fluid in the first two cases was clear, in the last-named distinctly turbid. Enumeration of the leucocytes in this last revealed 92 per cent. polymorphonuclear cells, and in several were small Gram-negative diplococci. Cultures were made from all three, and in every case the meningococcus was isolated. The nature of the organism was proved by sub-cultivation on various media and by fermentation tests. The same organism was recovered from the intraventricular fluid of the child Ruby, obtained post-mortem.

The macroscopic post-mortem signs were similar in every case, but more marked in Ethel, who had been longest ill. There was a distinct turbid haziness over the surface and base of the brain, extending down the cord, with excess of fluid (cultivation of this also yielded the organism), while in the case of Ethel the whole surface of the convexity of the brain, and particularly the interpeduncular space at the base, showed a much thicker layer of pearly lymph, and here and there definite flakes of it.

These meningeal signs were common to all, varying only in degree. The only other morbid conditions found were, in the case of Constantine, some oedema of the lungs, and some scattered petechiae on the surface (he had exhibited the most violent convulsions), and in the case of Ethel there were firm adhesions of the left pleura of old standing, and a similar but less marked condition of the right. There were no signs of tuberculosis anywhere in any of the cases.

The viscera of all four were sent in sealed jars to the Island Chemist for examination, but he reported that no signs of any poison were discovered.

The initial 'catarrhal' symptoms were in all probability what has been noted as the 'Premeningeal Catarrh,' set up by the presence of the organism at its 'site of election' in the upper part of the naso-pharynx, whence it spreads by way of the nerve canals through the cribriform plate of the ethmoid to reach the meninges.

The mother, baby, and the son Reuben, were admitted to hospital for observation, and swabs were taken from the upper reaches of the naso-pharynx in each case. The meningococcus was isolated from the boy's throat, not from the other two. He was, therefore, a 'carrier' of the organism, and was detained at the hospital.

The history of these patients is typical of nearly all the acute cases of 'Vomiting Sickness'; in fact, the medical man who sent the patients to hospital stated that had they been attacked during the winter months, he would have described them as typical 'vomiting sickness' cases.

This position is taken up by many physicians practising in country districts, namely, that if they meet with cases in the colder months they call them Vomiting Sickness, but at other times of the

year the deaths are certified as due to worms (which are present in most of the native children), gastro-enteritis, food poisoning, etc.

In my opinion, this idea is responsible for many sporadic cases being overlooked, and it is possible that such carry on the infection through the summer and form the starting point of the localised epidemics in the colder season.

From the cultures of the Peart cases I prepared a vaccine, not so much with a view to curative treatment of subsequent cases, for as a rule the course is so acute that no favourable result from such treatment could be expected, death often occurring in two or three hours after the onset of the first observed symptom, but as a prophylactic in districts where the outbreaks mostly take place.

#### SUMMARY

1. In four cases presenting the typical symptoms of 'Vomiting Sickness' the Weichselbaum's diplococcus has been isolated.

2. These symptoms correspond to those associated with foudroyante types of Cerebro-spinal Meningitis.

3. The organism was obtained from the cerebro-spinal fluid of all those from whom this fluid was taken during life, and from the cerebral ventricular fluid post mortem.

4. The organism was obtained from the naso-pharynx of one of the contacts of these cases, though himself apparently in perfect health.

5. The intracranial post-mortem signs were such as are consistent with death from Cerebro-spinal Meningitis at such an early stage, that is, with fulminating cases of the disease.

This focus did not spread, and the child (Reuben), who was proved to be harbouring the organism in his naso-pharynx, did not develop the disease.

#### METHODS OF INVESTIGATION

Having been struck by the peculiar hyperacuteness of these cases, and by the remarkable similarity of the symptoms to those reported from various districts of the island as occurring in the devastating epidemics which arise every cold weather, preparations were made

for thoroughly testing the hypothesis that some at least of these cases might be specially acute Cerebro-spinal Meningitis.

- (a) Forms of report for filling in the histories of those patients who were seen during life, and special forms for the reporting of post-mortem findings were drawn up and distributed to the various District Medical Officers.
- (b) Considering that the meningococcus does not grow well on ordinary nutrient agar, sloped tubes of nutrose ascitic agar were prepared, placed in boxes containing also sterilised swabs, slides, and ampoules of vaccine. These boxes were likewise distributed to the District Medical Officers with directions as to the use of the material contained. The tubes of sloped nasgar were for inoculation with cerebro-spinal fluid obtained by lumbar puncture, and for inoculation with material obtained by means of the sterile swab from the upper reaches of the naso-pharynx of contacts. The slides were for smears of the spinal fluid and of blood (as some of the cases might be malarial). The vaccine was for use with contacts for prophylactic purposes.
- (c) Anti-meningococcal serum was ordered.

Since the organism, presuming that a variety of the meningococcus might be the cause, is far from being a resistant one, it was considered that if the spinal fluid itself were sent, the organism might die before the specimen reached the laboratory, so that cultural tests could not be carried out. In some instances there is an interval of over twenty-four hours between the time of despatch of a specimen and its arrival at the laboratory. Secondly, that if the organisms were present in small numbers only, they might be overlooked in a smear. Thirdly, that if the inoculation of the selective medium were made on the spot, colonies would in many cases develop by the time the specimen reached the laboratory, and examination of these and sub-cultivation could be made the same day, and in this way a considerable saving of time would be effected.

On the whole, I may say that this system has worked very well, since in several instances the tubes on arrival at the laboratory

showed pure cultures, and in others there was sufficient growth to enable plating to be carried out at once for purposes of isolation.

The procedure subsequent to the box and its contents reaching the laboratory has been as follows:—

1. Smears were examined for enumeration of leucocytes and the relative proportions in which they were present, and for observations of any diplococci, intracellular or otherwise. A second smear was stained by Gram's method and counterstained. Sometimes, where nothing definite could be made out from the smears sent of the cerebro-spinal fluid, another smear of the liquid in the culture tube would give indications of the varieties of organisms present.
2. Any likely-looking colonies on the culture media were sub-cultured and examined.
3. The growth in the culture tube was plated for purposes of isolation.
4. The colonies so isolated were then examined, and sub-cultures made on nasgar and ordinary agar and incubated at 37° C. and at 25° C.
5. From the growth so obtained (only the former showed any, in many instances) the effect on various sugar media was noted. Dextrose, maltose, galactose, saccharose, mannite and lactose were generally employed.

#### GENERAL SYMPTOMS

Returning to the description of the various cases with the examination of which I have been concerned (prior to the 9th of January), it would be tedious, and would unduly prolong this short paper, to give details of the history of each one. The usual train of symptoms is as follows:—

The patient, usually a child, goes to bed apparently in its ordinary health, or there may be a history of slight indisposition, a cold in the head, or some loss of appetite, or a tendency to be 'droopy' and to lie down during the day preceding the actual onset. During the night the child wakes up and vomits—perhaps only once, perhaps three or four times—and complains of feeling ill. After

an hour or so he falls asleep again, and some three or four hours later, more or less, again wakes up, complains of pain in the abdomen (pain is used as a term for mere discomfort frequently among the natives), and almost at once begins again to vomit, usually frothy mucus, occasionally bile-stained, and later only watery fluid, with, in most instances, little or no effort, unless the stomach is quite empty, when troublesome retching ensues; if, however, food or liquid is taken, there is apparently effortless vomiting.

In a very short time, often a matter of a few minutes, convulsions come on, and there is 'stiffness of limbs and drawing back of the head' (as the parents describe it), coma rapidly succeeds and terminates in death.

In some there is no stiffness or retraction, but a general limp condition.

The total duration is short, the average being some four to twelve hours; the most rapid in my experience was thirty-five minutes. Frequently, therefore, the patient is not seen during life, and the history is both incomplete and unreliable, as it is obtained by questioning the parents, who, not having noticed any details of symptoms, will deny their presence, or affirm with equal readiness in order to ingratiate themselves, for the acuteness of the course formerly in many instances gave rise to the suspicion of poisoning.

When seen during life, the child is usually in the convulsive or comatose stage. The temperature is rarely high, usually 101°-102° F., but it may be normal. The pulse-rate is between 90 and 100, fairly strong; respiration 26-30, regular till towards the end, when the Cheyne-Stokes' type may appear. Kernig's sign is present in some of the cases, and may be distinctly more marked in one leg than in the other; rigidity of the neck muscles is more common than retraction of the head, and this rigidity is often overlooked because the flexion is not attempted in the strictly middle line. Rigidity may be fairly marked, but when the flexion is combined with lateral movement (as is the case where the test is applied with the child lying on its side) the stiffness may be masked, since lateral movement may be comparatively free in spite of distinct rigidity of the neck muscles.

The pupils are usually equal, moderately dilated, and, if the



coma is not deep, react normally. In a few there is photophobia, and in those retaining consciousness, general irritability and complaint of headache—not always by any means severe—usually frontal, sometimes general. Delirium is, so far as I have seen, quite uncommon; shortly before passing into the comatose state, the child may remark that it ‘feels very bad,’ but does not call attention to any particular symptom, or locate the pain, if such is complained of, to any particular spot.

In cases which do not end fatally, the state of coma is rarely present; there is vomiting, headache, convulsions with temporary loss of consciousness only, and recovery is almost as rapid as the onset. Within twenty-four hours a child, who has been seriously ill, may be sitting up in bed, and in twenty-four to forty-eight hours later be up and about, showing practically no symptoms except a little pallor, general debility which rapidly clears up, and some residual headache of no great severity, while others in the family, who did not seem to be any worse at the time, have passed into a state of coma and died in a few hours.

#### FURTHER CASES

In the following descriptions, where the words ‘usual history’ are employed, the course of events has been that sketched above.

The next case, after the Franklin Town outbreak, which came under my own personal notice (the tenth of the series of which I have notes) occurred also in Kingston, on October 1st, 1912. This, too, ran a more prolonged course than the generality of cases here.

(10) Male child, aged 6 years, was apparently quite well on September 25th. During the night he awoke and complained of intense headache, calling out ‘My head, my head.’ Went to sleep again, but early in the morning of the 26th awoke again and called out with headache, was seized with convulsions and lost consciousness. Slight vomiting only, but much more severe next day.

When admitted to hospital (October 1st) there was definite retraction of the neck, Kernig’s sign marked, pupils dilated and equal. Child quite conscious. Cerebro-spinal fluid turbid and

showing well-marked intracellular cocci, Gram-negative and diploid in arrangement, with 84 per cent. of the leucocytes polymorphonuclear.

A good growth of meningococci was obtained, from which a vaccine was made.

During the succeeding three weeks the patient's condition got gradually worse; there was general flexion and irritability, retraction of neck, wasting, etc., but very few twitchings and still some vomiting. There was no serum at hand, so an injection of 100 cocci was administered on October 24th. Note made on the 26th:—'Patient brighter and improving, temperature lower.' On November 7th:—'Improvement steadily maintained; retraction gone, Kernig's sign absent, is getting up and taking plenty of nourishment.' Two days later he went home, and reports state that he is in good health but exhibits violent outbursts of temper on trivial grounds, quite contrary to his former disposition.

This was in onset like the ordinary hyperacute Cerebro-spinal Meningitis, but later took on the characters of the subacute and recovered.

(11) P. McM., female, aged 4 years. History typical, namely, apparently well at 11 p.m., October 12th; early on the 13th was dull and restless (usually very bright and cheery), doubtful headache—child held its head, but did not make any definite complaint of it. About 7 a.m. child had a convulsion with the head thrown back, and general twitching and stiffness. Rapidly lapsed into coma and died without recovering consciousness.

At the autopsy the vessels of the surface of the brain were congested; there was a pearly haze over the hemispheres, with flakes of lymph in two or three spots. Ventricles contained excess of fluid; smear of cerebro-spinal fluid showed intracellular Gram-negative diplococci. Culture obtained on nasgar, and proved by subsequent tests to be the meningococcus.

(12), (13), (14). Three children, sisters, aged 8 years, 2 years, and 9 months, were brought to the hospital on October 23rd, 1912. All three had a history of headache and vomiting, and Amy (the one of 2 years) showed some staggering—she was old enough to walk straight when well—stiffness of neck muscles was present in all, Kernig's sign in the two older, but doubtful in the baby.

Swabs taken from high up the naso-pharynx (lumbar puncture was not permitted) gave meningococcus on cultivation, mixed with *Micrococcus catarrhalis* and some Gram-positive bacilli (Hoffmann), but separated by plating. They were all three seriously ill for the next week or so, especially the two younger, but after that made steady progress towards recovery.

It may be added that the mother of these children complained of headache and of pain along the neck and shoulder, but the organism was not obtained in her case.

(15) J. L. B., male, aged 4 years, October 19th. History given was that which has been described at length above. The duration of illness was only two hours. At the post-mortem examination the 'meninges were markedly congested, fluid in excess in the cerebral ventricles, and at the base of the brain. The fluid was turbid uniformly.' (Quoted from notes sent by Dr. Purchas.) No specimens forwarded, so the cause was not proved.

(16) C. M., male, aged 13 years. Reported December 1st, 1912, from Montego Bay. The only indication of anything which might be regarded as a premonitory symptom was a 'fresh cold' for a week preceding the sudden onset of vomiting at 4 p.m. The patient became unconscious at 6 p.m., convulsions started at 7 p.m. and recurred at intervals till death at 3 a.m. the following day. The total duration was, therefore, 11 hours.

In this case there were a few ascarides found; the mesenteric glands were enlarged. The organs, except the brain, were reported as normal. But here the 'meninges were markedly congested, especially over posterior halves of the hemispheres, and cerebellum, and at the base. Fluid was in excess, turbid and milky.'

The meningococcus was isolated from the culture sent.

(17) C. M. A., female, aged 4 years. December 7th. Usual history, except that the patient was said to have retained consciousness till death. The medical attendant states that he did not see the patient during life, and that the 'father's statements as regards the symptoms are unreliable.' Duration of illness 15 hours. Culture of spinal fluid yielded the meningococcus.

(18) H. W., female, aged 6 years. December 7th. Usual history.—First symptom—vomiting—'started early in the morning, and death occurred at 10 a.m.' Smears of spinal fluid gave a

differential leucocyte count of 82 per cent. polymorphonuclear, 13 per cent. lymphocytes and 5 per cent. endothelial cells, and showed Gram-negative diplococci mixed with coliform organisms. Smears of intraventricular fluid gave 85 per cent. polymorphs, 12 per cent. lymphocytes and 3 per cent. endothelial cells, and the same organisms.

The culture was badly contaminated, probably owing to the long interval (fifty-six hours) between death and the autopsy, and I was unable to isolate the diplococci. This case, therefore, was associated with a Gram-negative diplococcus in the spinal fluid, the nature of which was not definitely proved.

(19) A. J., male, aged 2 years. December 19th. Usual history of vomiting, succeeded by coma, but there was no mention of convulsions. Duration of illness six hours. Meninges dull, vessels congested; fluid in ventricles and spinal canal in excess and turbid.

The fluid sent showed Gram-negative diplococci, but they did not grow on the culture medium.

(20) R. T., female, aged 6 years. Porus District. December 22nd, 1912. This is a very good instance of the condition under description, because, having been sent down to investigate a small outbreak at Porus, I was able to see the patient myself during life and to take specimens of the blood and spinal fluid, and to perform the autopsy almost immediately after death took place.

The patient was a well-nourished child, and was said to have been quite well until 6 p.m. on December 21st, when an attack of vomiting came on. There was little or no complaint of headache. After sleeping for several hours, she commenced to have attacks of convulsions at intervals, from 4 a.m. on December 22nd, during which she 'went quite stiff.' When I saw the patient at 12 noon she was comatose. There was a general limp condition of the muscles, but on flexing the head in the middle line the neck muscles felt hard and stiff. Kernig's sign was marked in both legs, but more so in the left than in the right. There was a small group of herpetiform spots on the lips at the right side of the mouth, but no discernible rash on the body.

I took a blood smear and also spinal fluid smears and some of the fluid for culture. There was no recovery of consciousness, and

death took place at 12.30 p.m.; the total duration from the first onset of symptoms being 18½ hours.

All the organs appeared normal except that the mesenteric glands were enlarged, and the brain and meninges were markedly congested; there was a general haziness over convexity and base, more over the right hemisphere, and in parts there was distinct opalescence to milkiness. The ventricles were filled with clear fluid.

The smears of the spinal fluid taken showed many Gram-negative diplococci, several intracellular, but more lying free. The differential count of the leucocytes gave polymorphonuclears 26 per cent., lymphocytes 67 per cent., endothelial 7 per cent. The blood smear showed well-marked diplococci; this is the only case in which I have seen them in a blood smear taken during life, though it is only right to say that I have had very few opportunities of examining blood smears taken shortly before death.

The culture tubes showed several small colonies of Gram-negative diplococci which subsequent tests proved to be meningococci; and in this instance, therefore, not only was there definite Cerebro-spinal Meningitis, but a condition of meningococcaemia was shown to be present.

(21) D. D., male, aged 11 years. December 20th, 1912. The history in this case was typical, except that the symptoms were a little more drawn out. He complained of frontal headache and chilliness on December 18th at 11 a.m., and vomited in all sixteen times during that and the succeeding day. Was walking about in the evening of the 19th, and complained about 11 p.m. that the lamplight hurt his eyes. He was restless all that night, and had frequent convulsive movements of the limbs with retraction of the head and neck, and general signs of cerebral irritation till 4 a.m. on the 20th, when coma supervened, and he died at 11 a.m. The duration, therefore, was forty-eight hours.

Post-mortem report stated that there were some round worms in the intestines and some congestion of the mucous membrane of the stomach, but beyond this the only abnormality noticed was marked congestion of the meninges, and a general dulling and loss of glistening appearance of them, with excess of fluid in the ventricles.

No cultures or specimens were sent from this case, so the proof

of the cause was not forthcoming. The case is described for two reasons: firstly, because several similar cases followed it in which the organism was detected; and secondly, because it is a good example of the partial recovery or comparatively calm interval between a violent onset and an equally violent return of more serious symptoms which usually terminate fatally.

(22) R. E., male, aged 7 years. December 24th. Same district. Usual history. 'Duration 24-30 hours.' Spinal fluid gave typical cultures, and the meningococcus was proved.

The last-mentioned cases were the forerunners of a small epidemic in this district. Details of the individual cases need not be given, as they would be largely a repetition of what has been already stated; nevertheless, there are some points of interest about them, which may be briefly summed up as follows:—

Nineteen cases occurred during the last week of the year 1912, of which notes were sent to me. In nine of these no lumbar puncture was performed, and therefore, however typical the symptoms, they cannot be said to be proved cases of Meningitis. In seven of the nine, however, nearly all the classic symptoms—headache, vomiting, irritability, rigidity, Kernig's sign—were present, so that there is a fairly strong probability that these were instances of the disease; two of them recovered within three days and the rest within a week.

In six of the remaining twelve there was no symptom recorded except vomiting; these rapidly cleared up with a stomachic mixture, and I think they were probably merely gastric disturbances of a mild type.

Lastly, in six of the ten specimens of fluid sent up, the meningococcus was isolated from the spinal fluid and proved; three of them terminated fatally—one aged 7 years was ill for thirty hours; a second, aged  $3\frac{1}{2}$  years, died after ten hours' illness; the duration in the third, an adult, could not be ascertained.

Twenty-two subjects, nine of them contacts, and thirteen showing what was thought to be early symptoms of the condition—vomiting (with no ascertainable cause), headache and malaise—were given an injection of the vaccine which had been prepared by me from a former case. Of these thirteen, three were proved by culture from the spinal fluid to be definite cases of Cerebro-spinal Meningitis; of the remaining ten there is no evidence to show whether they were

cases of meningitis, worms, gastro-intestinal upset, or for the matter of that any other disease associated with vomiting, but it may be mentioned that none of the vaccinated contacts have so far been attacked, and none of the suspected or proved cases who had been vaccinated have died.

In the smear of the spinal fluid from a boy of 7 years of age, who died in ten hours, and in whose case the meningococcus was isolated, I found also several spirochaete-like bodies, or long somewhat tapering bacilli. Whether these have any causal connection with the disease I cannot say, but I may mention, in passing, that in two cases in which I have seen these bodies, the course has been exceptionally rapid. The second died in seven hours after the onset of the vomiting. In neither case did this peculiar organism develop on the medium used.

Of eleven cases subsequently reported with symptoms similar to those already detailed, spinal fluid cultures were sent up from seven. In three instances the meningococcus was isolated; in three no growth occurred; in the remaining tube there was a slight growth which had developed during the transit of the culture to the laboratory, but on arrival there after the laboratory had been closed for the day, the box containing it was, in excess of zeal on the part of the recipient, placed on ice, and the organism had been killed, for sub-cultivation failed altogether.

#### NOTE ON VACCINE TREATMENT

I did not expect any beneficial effects from vaccine treatment in the acute cases of the disease, as has been already stated. The vaccine was intended for prophylactic use mainly, and secondarily for chronic cases should such be met with. For the acute and hyperacute cases the anti-meningococcic serum was ordered, but there are points militating against its employment even in many of these. Firstly, there is the difficulty of keeping the serum in warm climates in districts where no ice is obtainable; secondly, though it has been stored in various parts of the island where ice can be procured, nevertheless, many of the cases are so rapidly fatal that death occurs before the serum arrives, although it may have been telegraphed for on appearance of the earliest symptoms and have been despatched by special messenger without delay; thirdly, the

serum must be injected intraspinally and repeated on three successive days at least, and if the case terminates fatally, the parents are almost certain to ascribe the death to the medical man's action in injecting fluid into the spinal canal.

Apart from the cases in which the vaccine was used prophylactically, I do not think that the conclusion is justified that the happy results following its employment in some of the cases referred to above can be attributed to its use. The condition was too severe for the small dose employed to have much effect, if any; also the amelioration was too rapid and has been too well maintained to justify any inference that the improvement leading to recovery was the direct result of the small injections made. I feel that, though 'post hoc,' there are no grounds for regarding the recovery as 'propter hoc,' at all events until further reports of the efficacy of the vaccine in similar cases have been received.

#### GENERAL SUMMARY

1. In several cases of illness with sudden onset in apparently healthy subjects, terminating fatally in a high percentage of those attacked, I have isolated a Gram-negative diplococcus from the spinal fluid.

2. This organism gives the morphological and cultural characters of Weichselbaum's *Diplococcus intracellularis meningitidis*, except that in galactose it does not always give a definite reaction, the medium in some instances not being affected. The maltose and dextrose, however, are always typically acted upon.

3. These cases exhibit in many instances a symptom-complex which has for years been spoken of in Jamaica as 'Vomiting Sickness.'

4. The disease breaks out in localised epidemic form in various parts of the island every cold weather, that is, from about the middle of December to the end of February or beginning of March.

5. The disease occurs at other times as sporadic cases, but apparently does not spread extensively.

6. It is a curious thing that practically all the cases are of the hyperacute variety, either recovering in a few days, or dying in a few hours. One rarely sees the subacute cases during the epidemic times, and never, so far as I am aware, the chronic ones, unless



some of the natives one meets with who are chronically deaf, or have seriously defective vision, or who suffer from fits, are instances of Cerebro-spinal Meningitis with permanent sequelae. Of this there is no proof.

7. In two instances a spirochaete-like body, or long curving bacillus has been seen in the smears made directly from the fluid obtained by lumbar puncture. What part, if any, this takes in producing the symptoms I have had no means of discovering.

8. The disease is very rare amongst the white population; I have known of only three instances so far during the past year. Possibly this is due in part to better hygienic conditions, less crowding, and so forth, but not entirely, because

9. I have not personally met with the condition once amongst the East Indian population, where overcrowding and bad hygiene are nearly, if not quite, as marked as in the case of the native. For this, also, I am unable to offer any explanation at present, though it may be noted that the food supply of the East Indian is usually better than that of the West.

PATHOLOGICAL LABORATORY,  
THE PUBLIC HOSPITAL,  
KINGSTON, JAMAICA, Feb. 18, 1913.